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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/981,852	10/17/2001	David Merricks	50550	7975

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c/o EDWARDS & ANGELL, LLP
Dike, Bronstein Roberts & Cushman, IP Group
P.O. Box 9169
Boston, MA 02209

EXAMINER

NGUYEN, HA T

ART UNIT PAPER NUMBER

2812

DATE MAILED: 02/07/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/981,852

Applicant(s)

MERRICKS ET AL.

Examiner

Ha T. Nguyen

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☒ Interview Summary (PTO-413) Paper No(s) 7
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Notice to Applicants

1. Applicants' Amendment and Response to the Office Action mailed 9-9-02 has been entered and made of record (Paper No. 8).

Response to Amendment

2. In view of Applicants' amendment to the claims, the rejections of claims 1-13 under 35 U.S.C. 102 or 103, as been anticipated by Mahapatra et al. (U. S. Patent 6301399, hereinafter "Mahapatra") or unpatentable over Mahapatra combined with Zhu et al. (U.S. Patent 6402592), Kaneko et al. (U.S. Patent 6416571, hereinafter "Kaneko"), or Cohen (U.S. Patent 6136707) . have been withdrawn.

Applicants' arguments with regard to the rejections under 35 U.S.C. 102 or 103 have been fully considered, but they are not deemed to be persuasive. The response to these arguments will be incorporated in the new ground of rejection given below.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103^e and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 2, 4, 6, 7, 9, and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen in view of Mahapatra.

[Claims 1, 6, and 11-13] Referring to Figs. 3 and 4 and related text, Cohen discloses a method of manufacturing an electronic device (inherently an article produced) comprising the step of contacting a metal seed layer having discontinuities 126 disposed on a substrate 112 having one or more apertures having a size of $\leq 1\mu\text{m}$ with a copper electroplating bath, the examiner interprets that when the conformal seed layer 128 is formed by electroless plating, the non-conformal seed layer 126 contacts a copper electroplating bath, the substrate containing one or more apertures (see col. 2, line 7- col. 3, line 4), the non conformal seed layer is enhanced by contact with a Cu electroplating composition in the formation of the conformal seed layer; Cohen also discloses a method for removing excess material from a semiconductor wafer containing one or more aperture by using a chemical mechanical planarization process to remove the excess material from the semiconductor wafer; wherein the apertures contain a seed layer deposit covered by an electroplated copper layer (See col. 6, lines 25-44). But it does not disclose expressly the details about the composition of the Cu bath, a bath of an alkaline electroplating composition comprising copper pyrophosphate. However, the missing limitations are well known in the art because Mahapatra discloses this feature (See col. 6, lines 20-30). A person of ordinary skill is motivated to modify Cohen with Mahapatra to obtain plated copper film of desirable characteristics.

[Claims 2 and 7] Mahapatra also discloses wherein the electroplating bath has a pH of from 8 to 9 (see col. 6, lines 29-35); and

[Claims 4 and 9] wherein the electroplating bath further comprises one or more bases selected from ammonium hydroxide of tetra(C1-C4)alkylammonium hydroxide (see col. 6, lines 29-35).

Therefore, it would have been obvious to combine Cohen with Mahapatra to obtain the invention as specified in claims 1, 2, 4, 6, 7, 9, and 11-13.

5. Claims 1, 2, 4, 6, 7, 9, and 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai et al. (U.S. Patent 6110817, hereinafter "Tsai") in view of Mahapatra.

[Claims 1, 6, and 11-15] Referring to Figs 1-4 and related text, Tsai discloses a method of manufacturing an electronic device (inherently an article produced) comprising the step of contacting a metal seed layer 14 having discontinuities disposed on a substrate having one or more apertures having a size of $\leq 1\mu\text{m}$ with a copper electroplating bath, the substrate containing one or more apertures, the seed layer is enhanced by contact with a Cu electroplating composition (see col. 3, lines 6-47), a seed layer formed by PVD inherently contains discontinuity (see Cohen); Tsai also discloses a method for removing excess material from a semiconductor wafer containing one or more aperture by using a chemical mechanical planarization process to remove the excess material from the semiconductor wafer; wherein the apertures contain a seed layer deposit covered by an electroplated copper layer (See col. 4, lines 43-46); subjecting the electroplating bath to sufficient current density to provide a metal seed layer substantially free of discontinuity (see col. 3, line 38-col. 4, line 5), because Tsai uses current density similar to the instant claimed invention, it is inherent that Tsai's process produces the similar Cu characteristics. But it does not disclose expressly the details about the composition of the Cu bath, a bath of an alkaline electroplating composition comprising copper pyrophosphate. However, the missing limitations are well known in the art because Mahapatra discloses this feature (See col. 6, lines 20-30). A person of ordinary skill is motivated to modify Tsai with Mahapatra to obtain plated copper film of desirable characteristics.

[Claims 2, 4, 7, and 9] Mahapatra also discloses the limitations of claims 2, 4, 7, and 9, as shown above.

Therefore, it would have been obvious to combine with to obtain the invention as specified in claims 1, 2, 4, 6, 7, 9, and 11-15.

6. Claims 3, 5, 8, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen or Tsai in view of Mahapatra and further in view of Kaneko.

The combined teaching of Cohen or Tsai and Mahapatra discloses substantially the limitations of claims 3, 5, 8, and 10, as shown above.

But it does not disclose expressly the use of the use of a complexing agent or a brightener and its amount in the electroplating bath.

Art Unit: 2812

However, the missing limitations are well known in the art because Kaneko discloses these features (See col. 1, lines 39- 53 and col. 4, lines 36-42).

A person of ordinary skill is motivated to modify Mahapatra with Kaneko to obtain plated Cu film of desired characteristics . Note that Kaneko discloses that the use of complexing agent and/or brightener is conventional in plating, whether it is Cu plating or Cu-Sn plating the teaching still applies because the bath used for Cu-Sn plating contains Cu plating bath.

Therefore, it would have been obvious to combine Cohen or Tsai and Mahapatra with Kaneko to obtain the invention as specified in claims 3, 5, 8, and 10.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ha Nguyen whose telephone number is (703)308-2706 . The examiner can normally be reached on Monday-Friday from 8:30AM to 6:00PM, except the first Friday of each bi-week.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling, can be reached on (703) 308-3325. The fax phone number for this Group is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.



Ha Nguyen

Primary Examiner

02 - 05 - 03